

**TETRA TECH**

March 24, 2011

Mr. Rick Gibby
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

RECEIVED
MAR 28 2011
Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

**SUBJECT: February 2011 Methane Monitoring Report
Former Big Timber Sanitary Landfill
Sweet Grass County
Big Timber, Montana
Tetra Tech Project No. 1159731053.100**

Dear Mr. Gibby:

This letter summarizes landfill gas monitoring data collected by Tetra Tech on February 16, 2011 at the Big Timber Sanitary Landfill (Figure 1). These activities were conducted in general accordance with the *Final Amended Post-Closure Care Plan* and the Administrative Rules of Montana (ARM) Section 17.50.1106.

Instrument Calibration

The RKI Eagle Portable gas meter was used for methane monitoring at the Big Timber Regional Landfill. This instrument was factory calibrated by RKI Instruments, Inc. October 18, 2010. Prior to this monitoring event, the instrument was also recalibrated at zero percent methane by Shane Ewert, Tetra Tech's Environmental Technician.

Monitoring Results

During this monitoring event Tetra Tech measured concentrations of methane and explosive gases, expressed as a percentage of the lower explosive limit (LEL), in all landfill gas monitoring points and on-site building (Figures 1 and 2). No explosive gas concentrations at or above the instrument detection limit of 0.1 percent of the LEL were detected. Methane was detected in monitoring points BTM-1 and BMT-2 at 10 and 25 parts per million (ppm), respectively. However, these trace concentrations of methane are well below LEL instrument detection limits and may be from naturally occurring organic matter decay. The data from this event is presented in the table below.

Tetra Tech

P.O. Box 30615, Billings, MT 59107
618 South 25th Street, Billings, MT 59101

Tel 406.248.9161 Fax 406.248.9282 www.tetrattech.com

Closed

County Sweet Grass
Facility & # Big Timber #308
Closure Landfarm
Finan Assur Liner
GW Corr Meas Methane
GW Monitoring O & M
GW Reports Run-on
Inspections
Other: _____

Closed

County Sweet Grass
Facility & # Big Timber #308
Closure Landfarm
Finan Assur Liner
GW Corr Meas Methane
GW Monitoring O & M
GW Reports Run-on
Inspections
Other: _____



BIG TIMBER SANITARY LANDFILL GAS MONITORING MEASUREMENTS February 16, 2011								
Location	Date	Time	Barom	LEL %	Oxygen %	Methane %	Carbon Dioxide %	Comments
SHOP	02/16/11	9:00	30.05	<0.1	20.9	<0.1	<0.1	
BTM-1	02/16/11	9:10	30.05	<0.1	20.9	<0.1	0.2	10 ppm Methane
BTM-2	02/16/11	9:22	30.05	<0.1	20.9	<0.1	<0.1	25 ppm Methane
BTM-3	02/16/11	9:35	30.05	<0.1	20.9	<0.1	<0.1	
BTM-4	02/16/11	9:46	30.05	<0.1	20.9	<0.1	<0.1	
Notes: ppm – parts per million %LEL=Percent of Lower Explosive Limit <0.1=Below Detection Limit NM=Not Measured Barom=Barometric pressure in Inches of Mercury								

Based on a review of this data, there are no significant soil vapor impacts at the site from the former Big Timber Landfill. Therefore, only the annual inspection of the property should continue in accordance with Post-Closure Care Plan through the year 2027.

If you have questions concerning this monitoring, please call us at (406) 248-9161. For your convenience, we have forwarded a copy of this report to the Montana Department of Environmental Quality (MDEQ). We appreciate the opportunity to provide environmental consulting services to the City of Big Timber.

Respectfully Submitted,

Tetra Tech

Jeff R. Rice
Environmental Group Manager

JRR/ba

N:\TYPING\ENV-FAC\9731053\City of Big Timber Methane\Big Timber Landfill Methane Rpt 2011.doc

Enclosures: Figure

cc: Gayle McPherson
Martin Van Oort, MDEQ - Helena

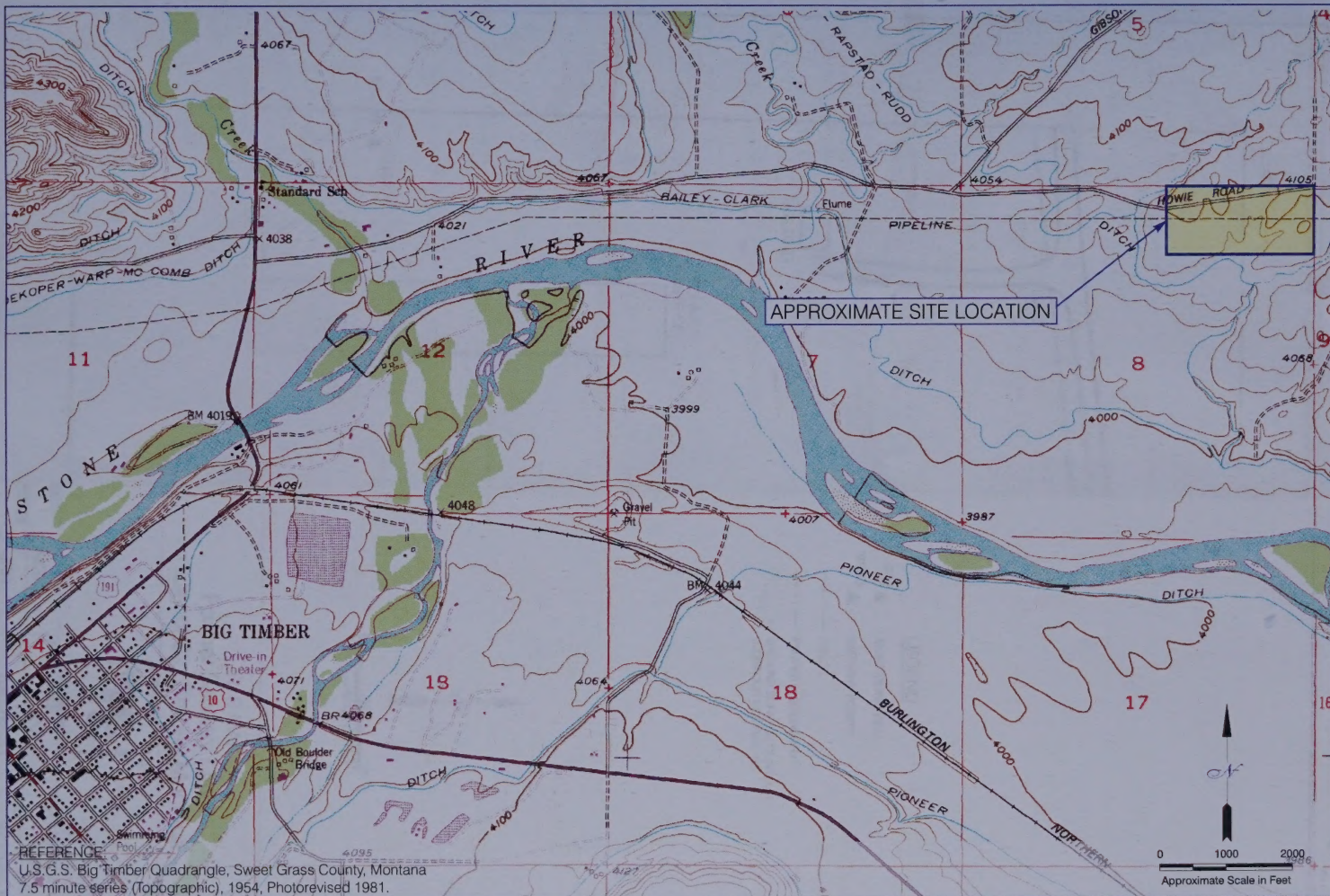
RECEIVED

MAR 28 2011

DEPT. OF ENVIRO. QUALITY
WASTE & UNDERGROUND TANK
MANAGEMENT BUREAU

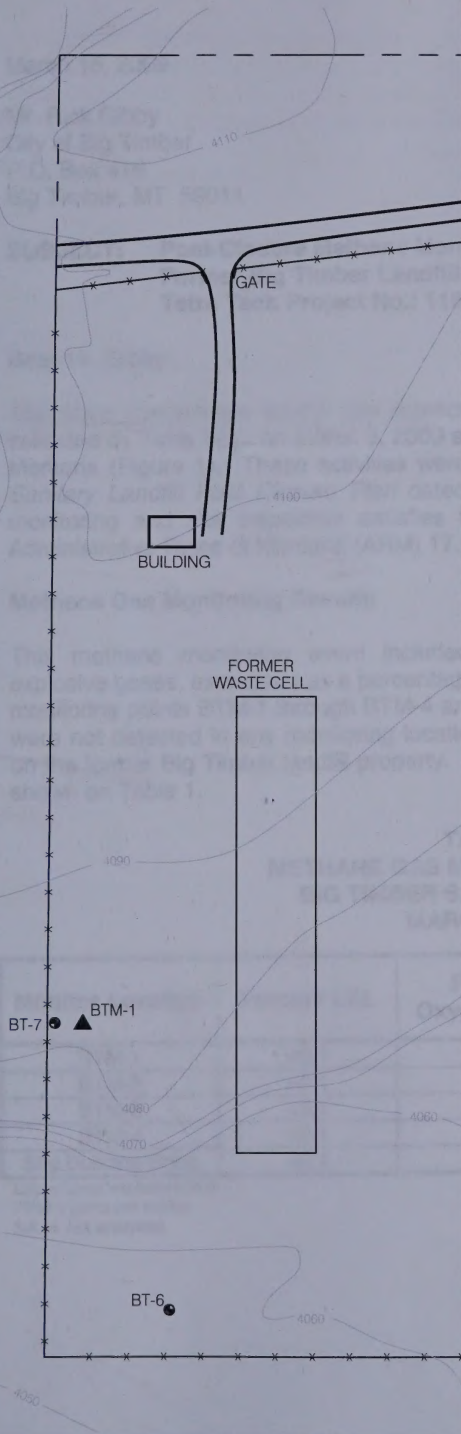


FIGURES



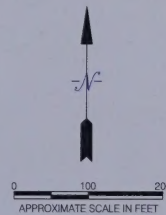
SITE LOCATION MAP
Former City of Big Timber Sanitary Landfill
Sweet Grass County, Montana

DATE: 03/17/2011	DRAWN BY: MGK
REVIEWED: JRR	APPROX. SCALE: 1" = 2000'
PROJ. NO.: 9731053.100	FIGURE NO.: 1



LEGEND

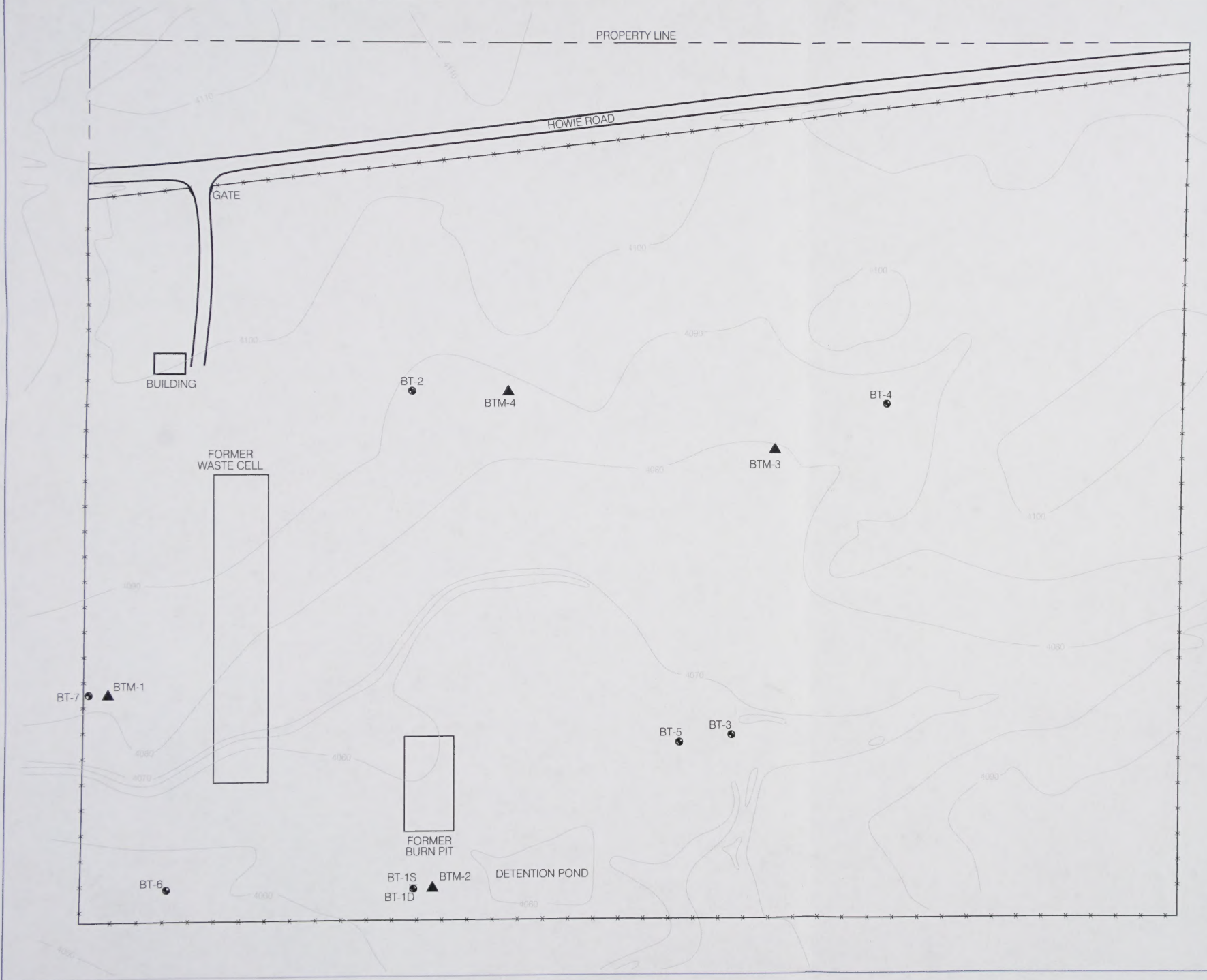
- BT-4  MONITORING WELL
- BTM-3  METHANE POINTS
-  FENCE
-  PROPERTY BOUNDARY
-  GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')



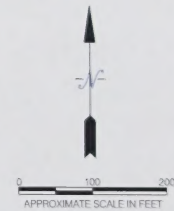
SITE MAP Former Sanitary Landfill City of Big Timber, Montana



RAWN:	MGK	APPROX. SCALE: 1"=200'	FIGURE NO. 2
VIEWED:	JRR	DATE: 03/17/2011	PROJECT NO. 9731053.100



- LEGEND**
- BT-4 MONITORING WELL
 - BTM-3 METHANE POINTS
 - FENCE
 - PROPERTY BOUNDARY
 - GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')



SITE MAP
Former Sanitary Landfill
City of Big Timber, Montana



DRAWN:	MGK	APPROX. SCALE: 1"=200'	FIGURE NO. 2
REVIEWED:	JRR	DATE: 03/17/2011	PROJECT NO. 9731053.100



TETRA TECH

March 16, 2009

Mr. Rick Gibby
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

RECEIVED
JUN 29 2009
Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

**SUBJECT: Post-Closure Methane Monitoring
Former Big Timber Landfill, Big Timber, Montana
Tetra Tech Project No.: 1159731053.200**

Dear Mr. Gibby:

This letter summarizes landfill gas monitoring data and post closure site inspection data collected by Tetra Tech on March 3, 2009 at the former Big Timber Landfill near Big Timber, Montana (Figure 1). These activities were conducted in accordance with the *Big Timber Sanitary Landfill Post Closure Plan* dated August 16, 2007. The post-closure methane monitoring and site inspection satisfies the solid waste management requirements of Administrative Rules of Montana (ARM) 17.50.531.

Methane Gas Monitoring Results

This methane monitoring event included measuring concentrations of methane and explosive gases, expressed as a percentage of the lower explosive limit (LEL), in landfill gas monitoring points BTM-1 through BTM-4 and the shop building (Figure 2). Explosive gases were not detected in any monitoring locations. Explosive gases have never been detected on the former Big Timber landfill property. A summary of the methane monitoring results is shown on Table 1.

**TABLE 1
METHANE GAS MONITORING RESULTS
BIG TIMBER SANITARY LANDFILL
MARCH 3, 2009**

Monitor Location	Percent LEL	Percent Oxygen (ppm)	PPM Methane	Percent Carbon Dioxide (ppm)
BTM-1	<0.1	20.3	<0.1	0.20
BTM-2	<0.1	20.8	<0.1	0.02
BTM-3	<0.1	20.3	<0.1	<0.01
BTM-4	<0.1	20.9	<0.1	<0.01
Site Building/Shop	<0.1	20.9	<0.1	<0.01

LEL = lower explosive limit
PPM = parts per million
NA = not analyzed



TETRA TECH

Mr. Rick Gibby
City of Big Timber
March 16, 2009

If you have questions concerning the work conducted for the site, please call us at (406) 248-9161. For your convenience, we have forwarded a copy of this report to the Montana Department of Environmental Quality. We appreciate the opportunity to provide environmental consulting services to the City of Big Timber.

Respectfully Submitted,

Tetra Tech

Jeff R. Rice
Environmental Group Manager

JRR/ba

Enclosures

N:\Typing\Env-fac\9731053\ BT 2009 Post Closure Methane Monitoring



FIGURES



SITE LOCATION MAP

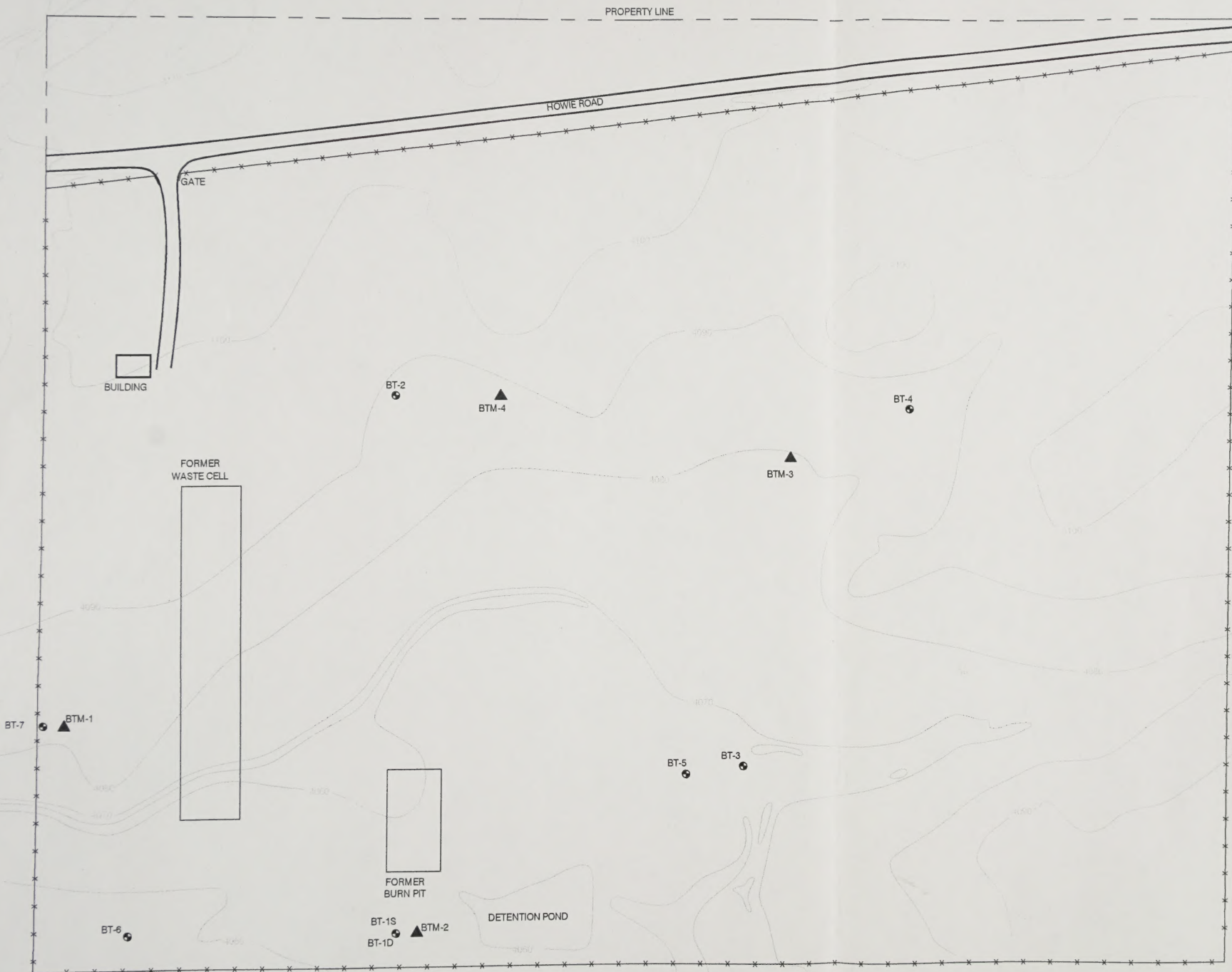
Former City of Big Timber Sanitary Landfill
 Sweet Grass County, Montana

DATE: 03/16/2009	DRAWN BY: MGK
REVIEWED: JRR	APPROX. SCALE: 1"=2000'
PROJ. NO.: 9731053	FIGURE NO.: 1

BT-4 ● MONITORING WELL
BTM-3 ▲ METHANE POINTS
— FENCE
- - - PROPERTY BOUNDARY
— GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10)

0 100 200
APPROXIMATE SCALE IN FEET

DRAWN:	MGK	APPROX. SCALE:	FIGURE NO.
REVIEWED:	JRR	DATE:	
		03/16/2009	
			2
			PROJECT NO.
			9731053



LEGEND

- BT-4 ● MONITORING WELL
- BTM-3 ▲ METHANE POINTS
- FENCE
- - - PROPERTY BOUNDARY
- GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')

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JUN 30 2009

Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

0 100 200
APPROXIMATE SCALE IN FEET

SITE MAP

Former Sanitary Landfill
City of Big Timber, Montana



DRAWN:	MGK	APPROX. SCALE:	1" = 200'	FIGURE NO.	2
REVIEWED:	JRR	DATE:	03/16/2009	PROJECT NO.	9731053



TETRA TECH

August 29, 2007

Mr. Rick Gibby
City of Big Timber
P.O. Box 416
Big Timber, MT 59011

RECEIVED

AUG 31 2007

Dept. of Enviro. Quality
Waste & Underground
Tank Management Bureau

**SUBJECT: Post-Closure Methane Monitoring
Big Timber Sanitary Landfill, Big Timber, Montana
Tetra Tech Project No. 9731053.200**

Dear Mr. Gibby:

This letter summarizes landfill gas monitoring data and collected by Tetra Tech on August 20, 2007 at the Big Timber Sanitary Landfill near Big Timber, Montana (Figure 1). These activities were conducted in general accordance with the *Draft Big Timber Sanitary Landfill Post Closure Plan* dated August 16, 2007. The post-closure methane monitoring partially satisfies the solid waste management requirements of Administrative Rules of Montana (ARM) 17.50.531.

Methane Gas Monitoring Results

This methane monitoring event included measuring concentrations of methane and explosive gases, expressed as a percentage of the lower explosive limit (LEL), in landfill gas monitoring points BTM-1, BTM-2, and BTM-4 (Figure 2). Methane monitoring was not conducted in well BTM-3 and the site building due to lack of access. Explosive gases were not detected in monitoring points BTM-1, BTM-2, or BTM-3. Results of the August 2007 methane monitoring results are presented in Table 1 below and a summary of the methane monitoring results conducted since 1994 is shown on Table 2, Appendix A.

**TABLE 1
METHANE GAS MONITORING RESULTS
BIG TIMBER SANITARY LANDFILL
AUGUST 20, 2007**

Monitor Location	Percent LEL	Percent Oxygen	PPM Methane	Percent Carbon Dioxide
BTM-1	<0.1	20.9	<0.1	0.32
BTM-2	<0.1	20.9	<0.1	0.26
BTM-3	NA	NA	NA	NA
BTM-4	<0.1	20.9	<0.1	0.28
Site Building	NA	NA	NA	NA

LEL = lower explosive limit

PPM = parts per million

NA = not analyzed

Tetra Tech

P.O. Box 30615, Billings, MT 59107
618 South 25th Street, Billings, MT 59101

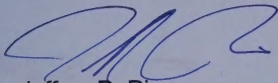
Tel 406.248.9161 Fax 406.248.9282 www.tetrattech.com

SW-0308-00

If you have questions concerning the work conducted for the site, please call us at (406) 248-9161. For your convenience, we have forwarded a copy of this report to the Montana Department of Environmental Quality. We appreciate the opportunity to provide environmental consulting services to the City of Big Timber.

Respectfully Submitted,

Tetra Tech



Jeffrey R. Rice
Environmental Group Manager

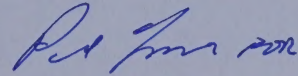
JRR(RNS)dm

Appendix A: Summary of Methane Gas Monitoring

Enclosures

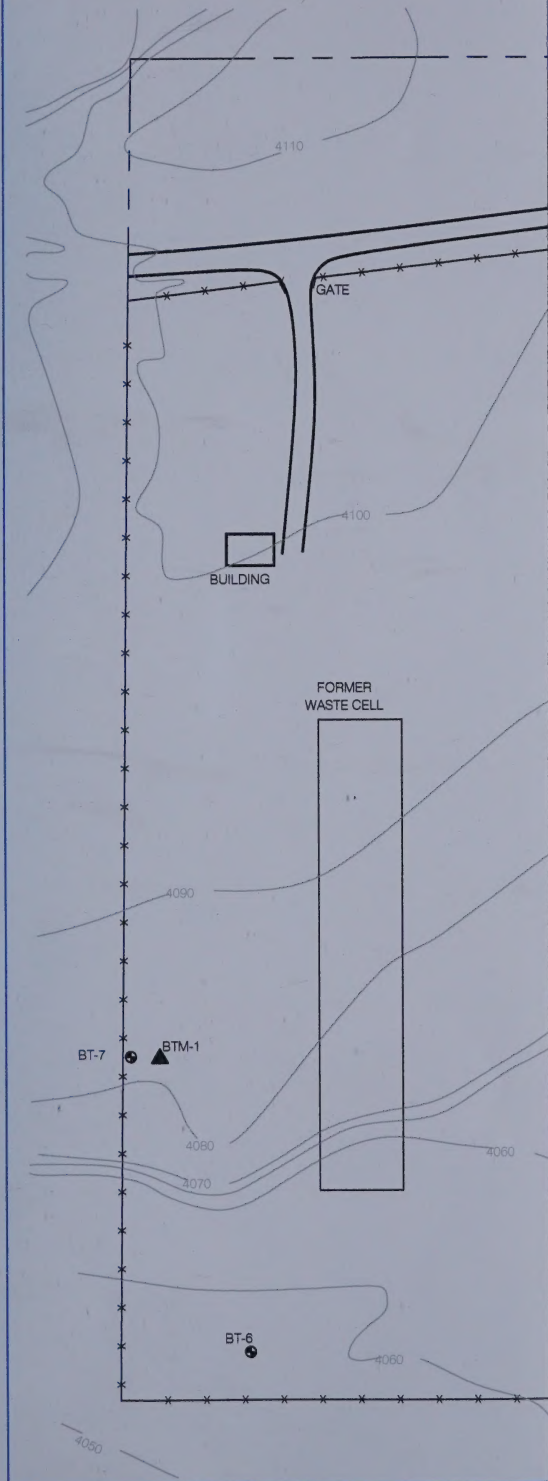
N:\typing\env-fac\9731053\BigTimberLandfill 2007 methane

cc: MDEQ –Helena



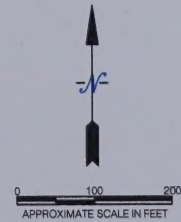
Ryan N. Sparhawk
Environmental Scientist

FIGURES



LEGEND

- BT-4 MONITORING WELL
- BTM-3 METHANE POINTS
- FENCE
- PROPERTY BOUNDARY
- GROUND SURFACE CONTOUR
(CONTOUR INTERVAL 10')



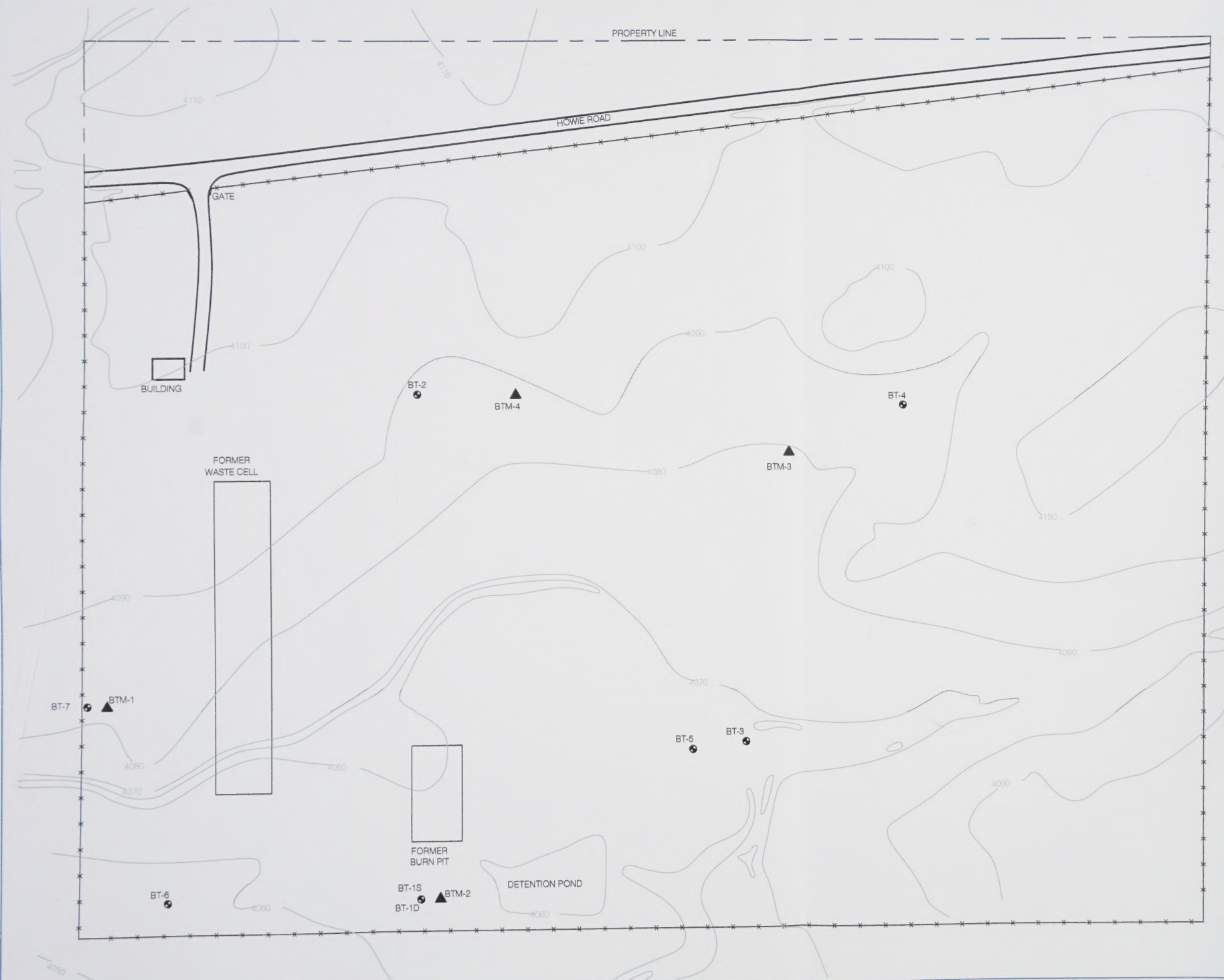
SITE MAP

Former Sanitary Landfill
City of Big Timber, Montana

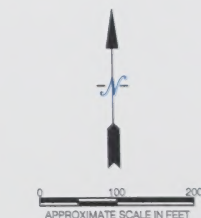


DRAWN:	MGK	APPROX. SCALE:	FIGURE NO.
REVIEWED:	JRR	DATE:	2
		08/21/2007	PROJECT NO.
			9731053





- LEGEND**
- BT-4 ● MONITORING WELL
 - BTM-3 ▲ METHANE POINTS
 - FENCE
 - - - PROPERTY BOUNDARY
 - 4080 GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')



SITE MAP Former Sanitary Landfill City of Big Timber, Montana			
			
DRAWN:	MGK	APPROX. SCALE:	1"=200'
REVIEWED:	JRR	DATE:	08/21/2007
		FIGURE NO.	2
		PROJECT NO.	9731053

APPENDIX A

Summary of Methane Gas Monitoring

TABLE 2
SUMMARY OF METHANE GAS MONITORING
BIG TIMBER SANITARY LANDFILL

Monitor Location	October 1994	January 1995	April 1995	July 1995	October 1995	January 1996	April 2001	August 2007
BTM-1	2	<1	<1	<1	<1	<1	<1	<1
BTM-2	<1	1	<1	<1	<1	<1	<1	<1
BTM-3	1	1	1	<1	<1	<1	<1	NA
BTM-4	<1	1	<1	<1	<1	<1	<1	<1
Site Building	NA	1	<1	1	<1	<1	<1	NA

LEL = lower explosive limit

NA = not analyzed

< = less than

Closed
County Sweet Grass
Facility & # City of Big Timber #308
Closure Landfarm
Finan Assur Liner
GW Corr Meas Methane
GW Monitoring O & M
GW Reports Run - On
Inspections
Other: _____

Draft Amended Post-Closure Care Plan

Big Timber Sanitary Landfill

Prepared for:

City of Big Timber

PO Box 416
Big Timber, MT 59011

Prepared by:

Tetra Tech

618 South 25th Street
Billings, MT 59101
(406) 248-9161

Fax (406) 248-9282

Tetra Tech Project No. 1159731053.200

August 24, 2007

Groundwater monitoring has been conducted at the Big Timber Sanitary Landfill from 1994 to 2001 and resumed in May 2007. The groundwater monitoring network consists of seven monitor wells, four upgradient (BT-2, BT-3, BT-4, and BT-5) and three downgradient of the waste cell and burn pit (BT-1S, BT-6, and BT-7; Figure 2). The monitor well logs are included as Appendix A.

Groundwater monitoring has consisted of measuring water levels in select wells (BT-1S, BT-2, BT-6 and BT-7; Figure 2) and preparing a groundwater potentiometric surface map. Groundwater samples were analyzed for the parameters listed in ARM 17.50.708(a)(iv)(I). Volatile organic constituents have never been detected in any landfill sample. Statistical analysis was conducted on the inorganic groundwater sampling results comparing upgradient results to downgradient results. Per MDEQ correspondence (MDEQ, 2007), three additional groundwater monitoring events will be conducted during 2007, 2009 and 2011.

3.4 Methane Gas Monitoring

Landfill gas was monitored for the percentage of lower explosive limit (LEL) six times between 1994 and 1996, then again during April 2001 and August 2007. A summary of the methane monitoring results is shown on Table 1. The percent LEL was used to monitor for potential methane gas in the four gas monitor wells (BTM-1 through BTM-4; Figure 2), and the landfill building.

Concentrations of explosive gases ranged from zero to a maximum of two percent of the LEL during the first monitoring event conducted during 1994. These levels are all well below the lower explosive limit of 100 percent. The most recent explosive gas measurements were conducted during May 2007 and explosive concentrations were below the instrument detection limit. Since the landfill is not located near any human-occupied structures and gases in the explosive range have not been measured, future methane gas monitoring will be conducted during groundwater monitoring events during 2009 and 2011.

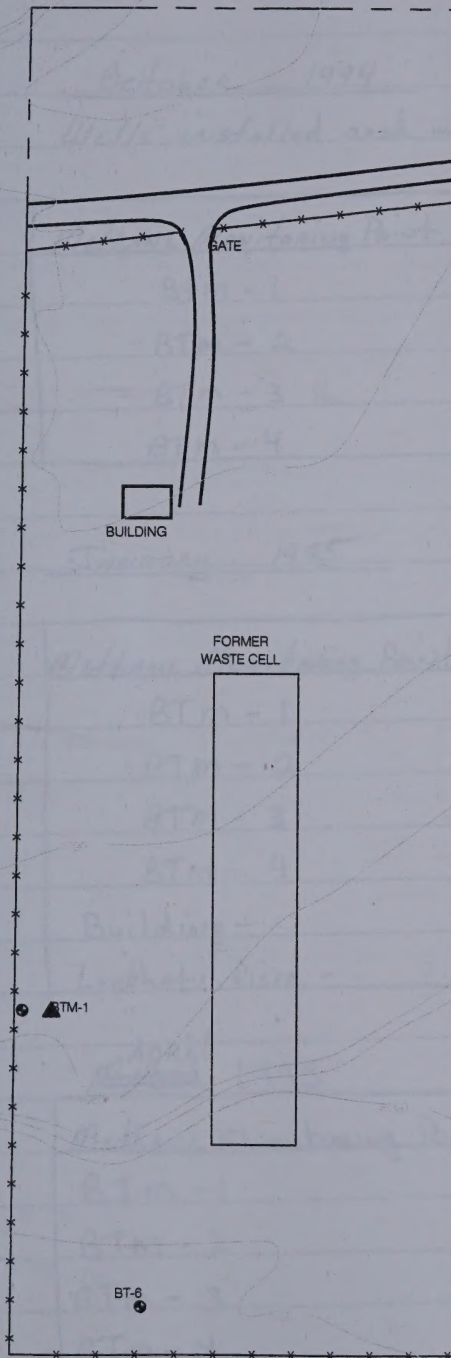
TABLE 1
METHANE GAS MONITORING RESULTS
BIG TIMBER SANITARY LANDFILL

Monitor Location	October 1994	January 1995	April 1995	July 1995	October 1995	January 1996	April 2001	August 2007
BTM-1	2	<1	<1	<1	<1	<1	<1	<1
BTM-2	<1	1	<1	<1	<1	<1	<1	<1
BTM-3	1	1	1	<1	<1	<1	<1	NA
BTM-4	<1	1	<1	<1	<1	<1	<1	<1
Site Building	NA	1	<1	1	<1	<1	<1	NA

LEL = lower explosive limit

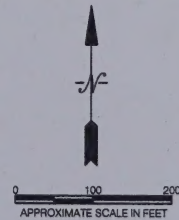
NA = not analyzed

< = less than



LEGEND

- BT-4 ● MONITORING WELL
- BTM-3 ▲ METHANE POINTS
- FENCE
- - - PROPERTY BOUNDARY
- - - GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')

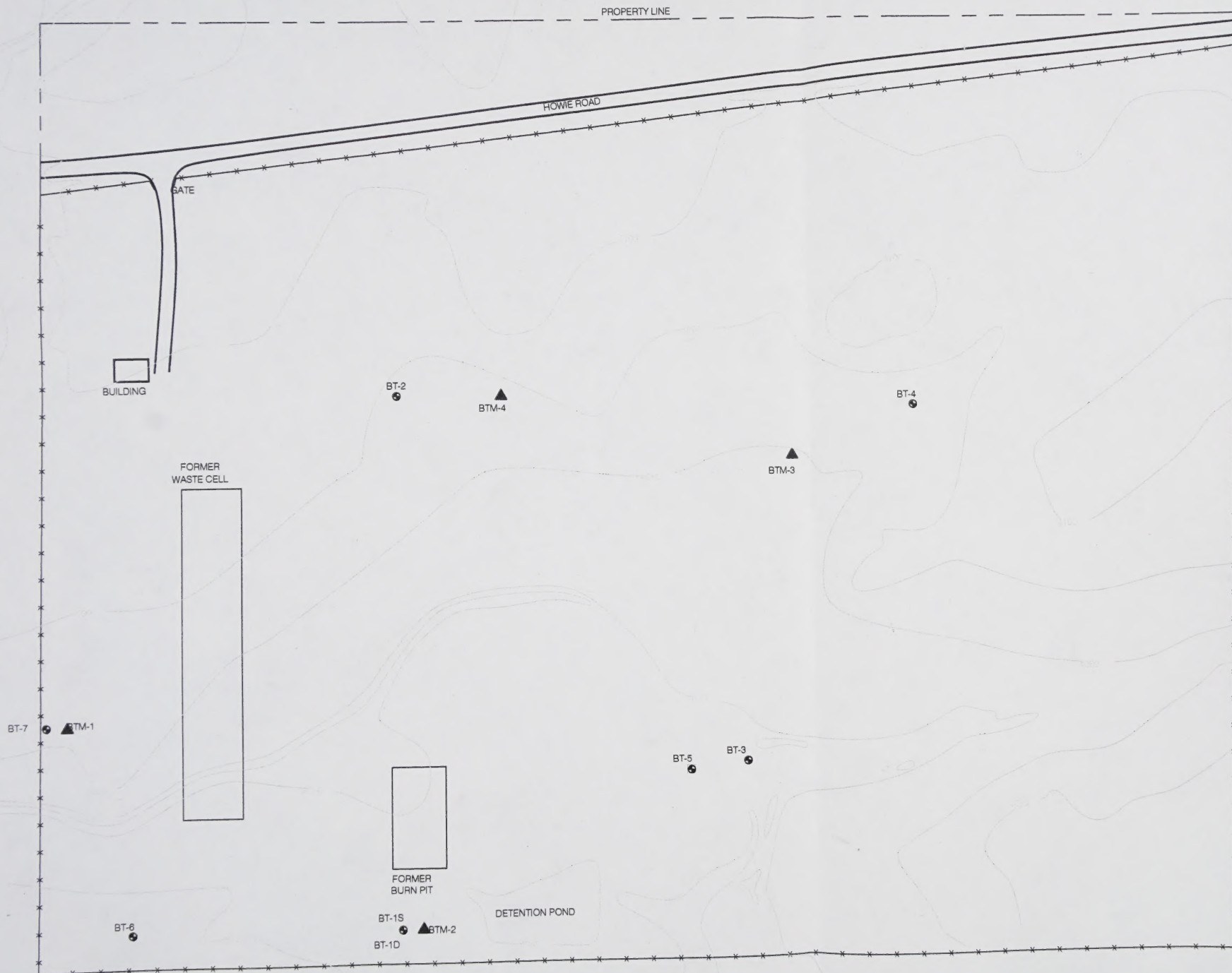


SITE MAP

Former Sanitary Landfill
City of Big Timber, Montana

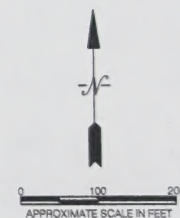


DRAWN:	MGK	APPROX. SCALE:	1" = 200'	FIGURE NO.	2
REVIEWED:	JRR	DATE:	07/24/2007	PROJECT NO.	9731053



LEGEND

- BT-4 ● MONITORING WELL
- BTM-3 ▲ METHANE POINTS
- FENCE
- - - PROPERTY BOUNDARY
- GROUND SURFACE CONTOUR (CONTOUR INTERVAL 10')



SITE MAP Former Sanitary Landfill City of Big Timber, Montana



DRAWN:	MGK	APPROX. SCALE:	1"=200'	FIGURE NO.	2
REVIEWED:	JRR	DATE:	07/24/2007	PROJECT NO.	9731053

Methane Monitoring at B.T. Landfill

1

October 1994

Wells installed and monitored by Huntingdon.

Methane Monitoring Point	Percent LEL
BTm - 1	2
BTm - 2	0
BTm - 3	1
BTm - 4	0

January 1995

Methane Monitoring Point	Percent LEL
BTm - 1	0
BTm - 2	1
BTm - 3	1
BTm - 4	1
Building -	-1
Leachate Riser -	1

~~March~~ ^{April} 1995

Methane Monitoring Point	Percent LEL
BTm - 1	0
BTm - 2	0
BTm - 3	1
BTm - 4	0
Building	-1
Leachate Riser	0

July '95

Methane Monitoring Point	Percent LEL
BTm 1 -	0
BTm 2 -	0
BTm 3 -	0
BTm 4 -	0
Building -	0
Leachate Riser -	1

Oct. '95

Methane Monitoring Point	Percent LEL
Btm 1 -	0
Btm 2 -	0
Btm 3 -	0
BTm 4 -	0
Building -	0
Leachate Riser -	0

Jan. '96 30th -5° North wind

Methane Monitoring Point	Percent LEL
BTm 1 -	0
BTm 2 -	0
BTm 3 -	0
BTm 4	0
Building	0
Leachate Riser	0

April '96 ^{30th} 45° Windy

Methane Monitoring Point	Percent LEL
Btm 1	0
Btm 2	1
Btm 3	1
Btm 4	0
Building	2
Leachate Riser	0

July '96 ^{30th} 83° Wind

Methane Monitoring Point	Percent LEL
Btm 1	0
Btm 2	1
Btm 3	0
Btm 4	0
Building	1
Leachate Riser	0

Report rec'd
Jan 17, 1995.

Big Timber (L.F.)
(Sweetgrass Co.)
Methane file

4.0 METHANE MONITORING

On October 10, 1994, four permanent methane monitoring points were installed at the locations shown on Figure 2. The methane points were also monitored for concentrations of explosive gasses on October 10, 1994. The following sections describe the methods used and results of this monitoring.

4.1 INSTALLATION OF METHANE MONITORING POINTS

Soil borings BTM-1 through BTM-4 were drilled around the perimeter of the landfill using standard hollowstem auger drilling techniques. The total depth of these borings ranged from 17.0 to 18.5 feet below ground surface. Lithologic logs of these borings are contained in Appendix E.

The methane monitoring points were completed with 15 feet of two-inch diameter, threaded joint, Schedule 40 polyvinyl chloride (PVC), 0.020-inch factory slotted well screen, and approximately five feet of two-inch diameter, Schedule 40 PVC casing. A #10-20 grade silica sandpack was installed from the total depth of the boring to approximately one-half foot above the top of the well screen. The remainder of the annulus was filled with bentonite pellets and cement grout. The points were completed with a six-inch diameter, aboveground locking well protector. Completion details for the methane monitoring points are included in Appendix E.

4.2 METHANE MONITORING

Methane monitoring points BTM-1 through BTM-4 were monitored for concentrations of explosive gasses using a MSA® Model 2A explosimeter. Air was purged from the monitoring points and the concentration of explosive gasses was then measured as a percentage of the lower explosive limit (%LEL). Monitoring of the methane monitoring points is summarized in Table 2.

TABLE 2
METHANE MONITORING RESULTS
BIG TIMBER SANITARY LANDFILL
BIG TIMBER, MONTANA
OCTOBER 10, 1994

METHANE MONITORING POINT	PERCENT LEL
BTM-1	2
BTM-2	0
BTM-3	1
BTM-4	0

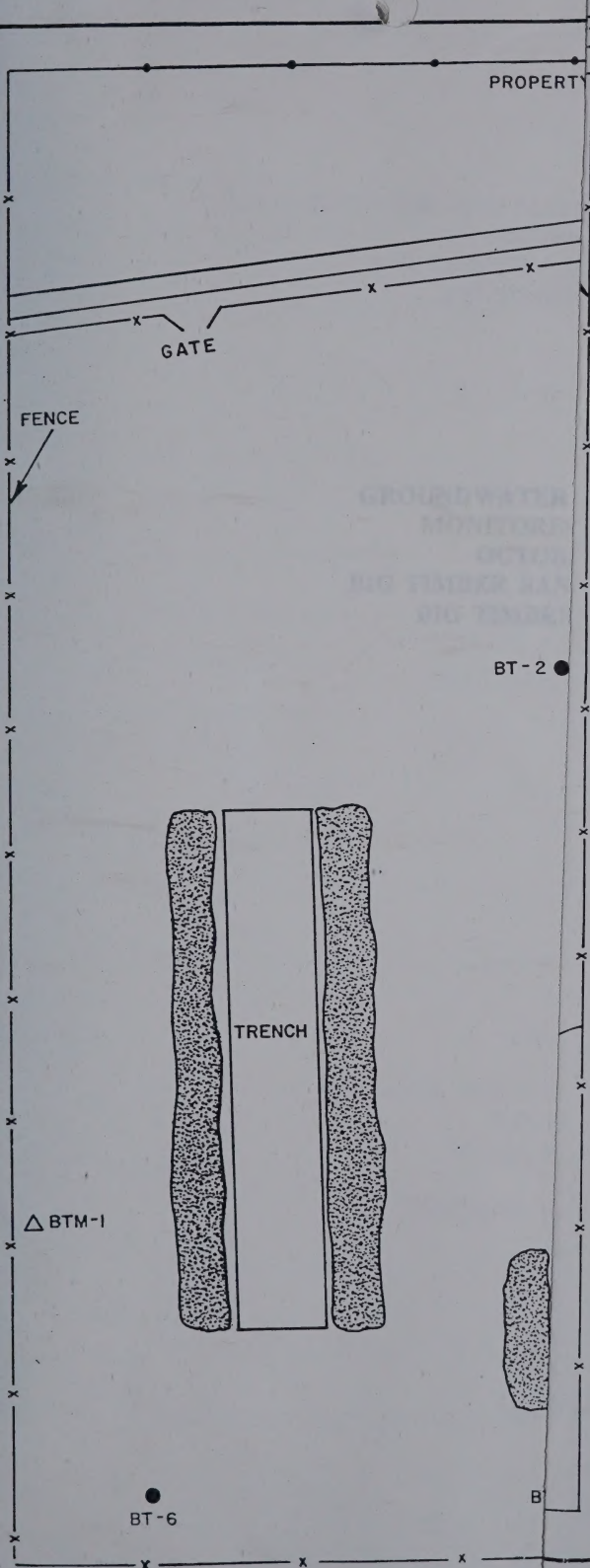
LEGEND LEL: Lower Explosive Limit

5.0 DISCUSSION OF FINDINGS

Concentrations of VOCs were not detected above their respective PQLs in any water samples collected at the landfill. Of the metals analyzed, only antimony, barium, cadmium, chromium, and copper were detected at concentrations greater than their respective PQLs.

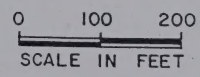
Concentrations of barium, cadmium, chromium, and copper were detected at levels more than an order of magnitude below their MCLs. Antimony was present in all monitoring wells, including the upgradient wells BT-2 and BT-4, in concentrations between 1.0 and 1.5 times greater than its MCL. However, quality assurance calculations show that antimony concentrations should be considered estimated concentrations. We believe that the presence of antimony in concentrations exceeding the MCL should not require assessment monitoring for the site due to its presence in concentrations exceeding the MCL in the upgradient wells.

Explosive gas concentrations were near or below detection limits along the eastern and western boundaries of the landfill. Explosive gasses were not detected along the northern and southern boundaries of the landfill.



LEGEND

- BT-1 ● MONITORING WELL
- BTM-1 △ METHANE POINTS
- x FENCE
- PROPERTY LINE
- INTERMITTENT STREAM



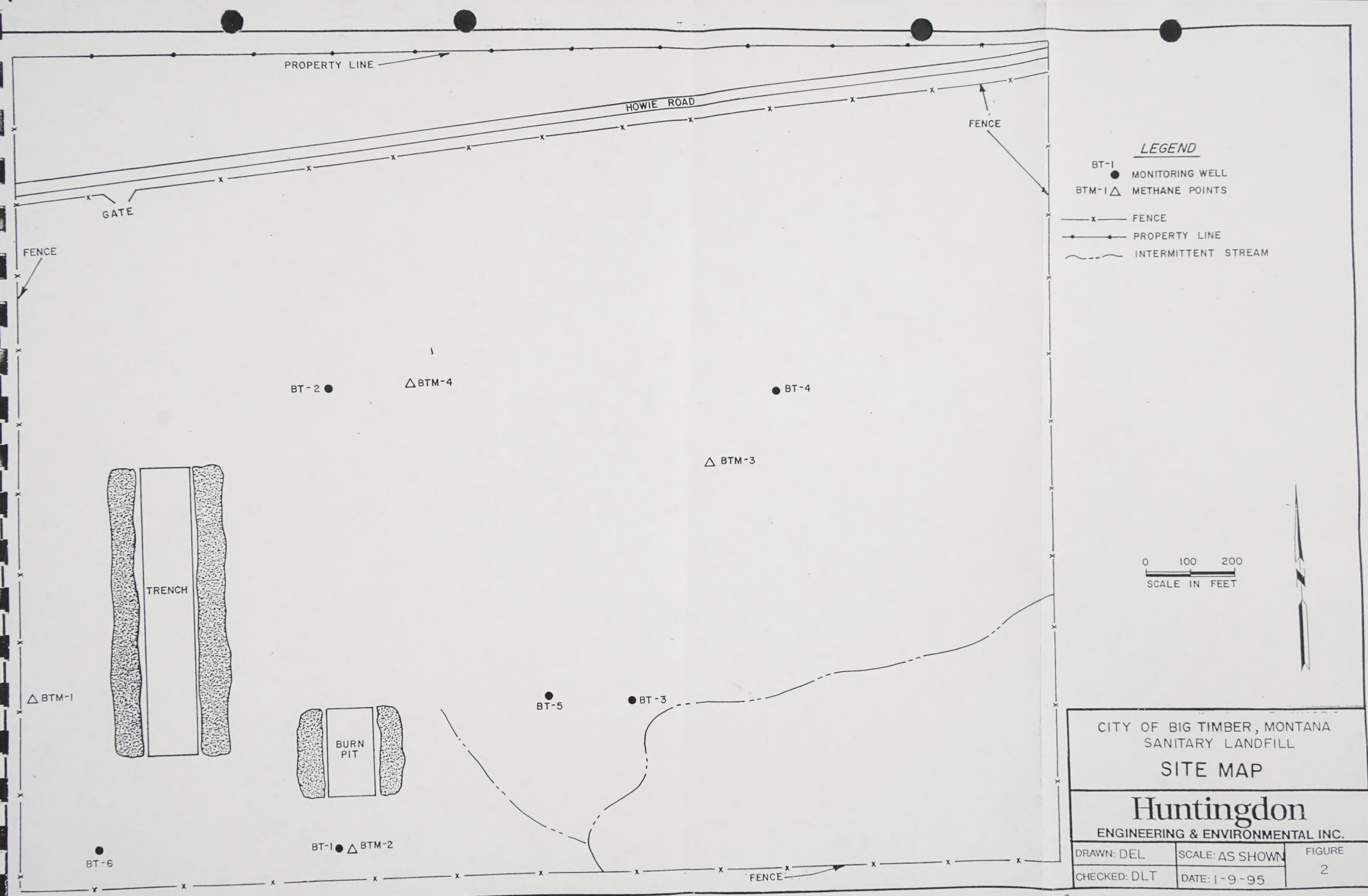
CITY OF BIG TIMBER, MONTANA
SANITARY LANDFILL

SITE MAP

Huntingdon

ENGINEERING & ENVIRONMENTAL INC.

DRAWN: DEL	SCALE: AS SHOWN	FIGURE 2
CHECKED: DLT	DATE: 1-9-95	



GROUNDWATER AND METHANE MONITORING RESULTS
OCTOBER, 1994
BIG TIMBER SANITARY LANDFILL
BIG TIMBER, MONTANA

GROUNDWATER AND METHANE
MONITORING RESULTS
OCTOBER, 1994
BIG TIMBER SANITARY LANDFILL
BIG TIMBER, MONTANA

P.O. Box 410
Big Timber, Montana 59011

Prepared by:

Huntingdon Engineering & Environmental, Inc.
P.O. Box 30613
Billings, Montana 59107

Huntingdon Project No. 94-657

January, 1995

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Prepared for:

City of Big Timber
P.O. Box 416
Big Timber, Montana 59011

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Billings, Montana 59107

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January, 1995

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TABLE 2
METHANE MONITORING RESULTS
BIG TIMBER SANITARY LANDFILL
BIG TIMBER, MONTANA
OCTOBER 10, 1994

METHANE MONITORING POINT	PERCENT LEL
BTM-1	2
BTM-2	0
BTM-3	1
BTM-4	0

LEGEND LEL: Lower Explosive Limit

5.0 DISCUSSION OF FINDINGS

Concentrations of VOCs were not detected above their respective PQLs in any water samples collected at the landfill. Of the metals analyzed, only antimony, barium, cadmium, chromium, and copper were detected at concentrations greater than their respective PQLs.

Concentrations of barium, cadmium, chromium, and copper were detected at levels more than an order of magnitude below their MCLs. Antimony was present in all monitoring wells, including the upgradient wells BT-2 and BT-4, in concentrations between 1.0 and 1.5 times greater than its MCL. However, quality assurance calculations show that antimony concentrations should be considered estimated concentrations. We believe that the presence of antimony in concentrations exceeding the MCL should not require assessment monitoring for the site due to its presence in concentrations exceeding the MCL in the upgradient wells.

Explosive gas concentrations were near or below detection limits along the eastern and western boundaries of the landfill. Explosive gasses were not detected along the northern and southern boundaries of the landfill.

6.0 RECOMMENDATIONS

Groundwater quality and methane concentrations at the Big Timber Sanitary Landfill are currently in compliance with MDHES regulations (ARM 16.14.706 and ARM 16.14.521). In order to maintain compliance, the following work should be conducted:

- ◆ A Sampling and Analysis Plan (SAP) should be prepared in accordance with ARM 16.14.706.
- ◆ Monthly monitoring of groundwater levels should be initiated to determine the appropriate times for semi-annual detection monitoring in accordance with ARM 16.14.706(4). Semi-annual groundwater monitoring should then be instituted.
- ◆ Quarterly monitoring of methane concentrations should be initiated in accordance with ARM 16.14.521(1)(g).

Work plans for these activities will be presented under separate cover.

Huntingdon

Engineering & Environmental, INC.

LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

WELL NO: BTM-1

SHEET NO: 1 OF 1

LOCATION: 345' N, 50' W OF WELL BT-6

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

DATE: WELL STARTED 10/10/94

COMPLETED 10/10/94

JOB NO: 94-857

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

DRILLED BY: W. NIEM

LOGGED BY: D. TULEK

REMARKS: NONE

LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE MATERIAL	S/L & BGS (ft./sec./ft.)	ORGANIC MATTER CONTENT (%)	WELL COMPLETION
-----	--------------------------------	-----------------	--------------------------	----------------------------	-----------------

APPENDIX E

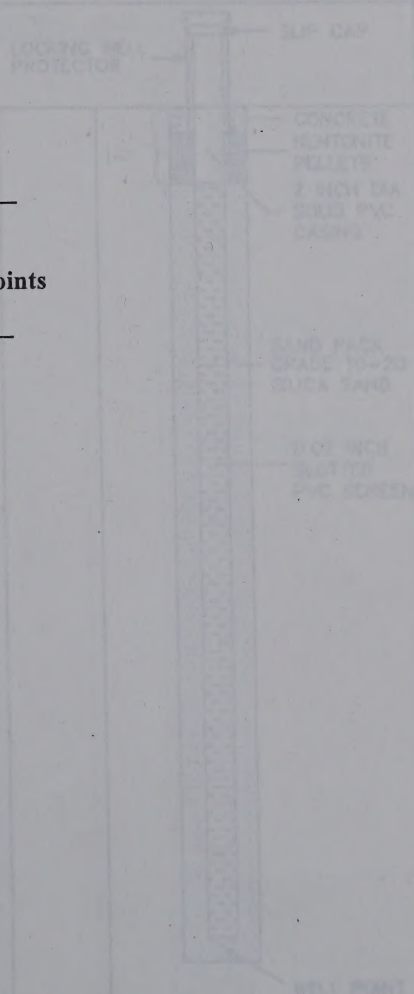
Logs of Methane Monitoring Points

SANDSTONE: silty fine grained, clay part
tan, dry, occasional clayey zones

SLISTONE: and silty, well cemented, brown

SHALESTONE

Bottom of hole = 17.0 feet



Engineering & Environmental, INC.

PROJECT: BIG TIMBER SANITARY LANDFILL

WELL NO: BTM-1

SHEET NO: 1 OF 1

LOCATION: 340' N, 50' W OF WELL BT-6

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

DATE: HOLE STARTED 10/10/94
COMPLETED 10/10/94

JOB NO: 94-657

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

DRILLED BY: W. NIEMI

LOGGED BY: D. TYLER

REMARKS: NONE

DEPTH (FT)	GRAPHIC LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE INTERVAL	S.P.T. (IN) (BLOWS/FT.)	ORGANIC VAPOR CONTENT (ppm)	WELL COMPLETION
0.5 1 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0	[Graphic Log Symbols]	SANDSTONE; very fine grained, silty, light tan, dry, occasional clayey zones				LOCKING WELL PROTECTOR → SLIP CAP CONCRETE BENTONITE PELLETS 2 INCH DIA SOLID PVC CASING SAND PACK GRADE 10-20 SILICA SAND 0.02 INCH SLOTTED PVC SCREEN 1.5'
10.0	[Graphic Log Symbols]					
15.0 15.5 16.5 17.0	[Graphic Log Symbols]	SILTSTONE; argillaceous, well cemented, brown SANDSTONE				
		Bottom of Hole = 17.0 feet				WELL POINT

Huntingdon

Engineering & Environmental, INC.

LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

WELL NO: BTM-2

JOB NO: 94-657

SHEET NO: 1 OF 1

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

LOCATION: 25' E OF WELL BT-1

DRILLED BY: W. NIEMI

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

LOGGED BY: D. TYLER

DATE: HOLE STARTED 10/10/94

REMARKS: NONE

COMPLETED 10/10/94

DEPTH (FT)	GRAPHIC LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE INTERVAL	S.P.T. (IN) (BLOWS/FT.)	ORGANIC VAPOR CONTENT (ppm)	WELL COMPLETION
0.0						SLIP CAP
0.5						LOCKING WELL PROTECTOR
1.0		SILTSTONE; sandy, clayey, friable, brown, dry				CONCRETE BENTONITE PELLETS
1.5						2 INCH DIA SOLID PVC CASING
2.0						
2.5		SHALE; dark gray, dry, white crystals of alkali salts or calcite				
3.0						
3.5						
4.0						
4.5						
5.0		SILTSTONE; argillaceous, well-cemented, brown				SAND PACK GRADE 10-20 SILICA SAND
5.5						
6.0						
6.5						
7.0						0.02 INCH SLOTTED PVC SCREEN
7.5						
8.0						
8.5						
9.0						
9.5						
10.0						
10.5						
11.0						
11.5						
12.0						
12.5						
13.0						
13.5						
14.0						
14.5						
15.0						
15.5						
16.0						
16.5						
17.0						
17.5						
18.0						
18.5		Bottom of Hole = 18.5 feet				WELL POINT

Huntingdon

Engineering & Environmental, INC.

LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

WELL NO: BTM-3

JOB NO: 94-657

SHEET NO: 1 OF 1

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

LOCATION: 200' SW OF WELL BT-4

DRILLED BY: W. NIEMI

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

LOGGED BY: D. TYLER

DATE: HOLE STARTED 10/10/94

REMARKS: NONE

COMPLETED 10/10/94

DEPTH (FT)	GRAPHIC LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE INTERVAL	S.P.T. (IN) (BLOWS/FT.)	ORGANIC VAPOR CONTENT (ppm)	WELL COMPLETION
5.0		SILTSTONE; clayey, friable, tan. to brown, dry				LOCKING WELL PROTECTOR SLIP CAP CONCRETE BENTONITE PELLETS 2 INCH DIA SOLID PVC CASING SAND PACK GRADE 10-20 SILICA SAND 0.02 INCH SLOTTED PVC SCREEN WELL POINT
11.0		SHALE; silty, brown, dry				
16.0		SILTSTONE; argillaceous, well cemented, dark brown				
17.0		Bottom of Hole = 17.0 feet				

Huntingdon

Engineering & Environmental, INC.

LOG OF METHANE MONITORING POINT

PROJECT: BIG TIMBER SANITARY LANDFILL

WELL NO: BTM-4

JOB NO: 94-657

SHEET NO: 1 OF 1

DRILL TYPE: MOBILE B-53, HOLLOWSTEM AUGER

LOCATION: 175' E OF WELL BT-2

DRILLED BY: W. NIEMI

ELEVATION: TOP OF HOLE NOT MEASURED
GROUNDWATER

LOGGED BY: D. TYLER

DATE: HOLE STARTED 10/10/94

REMARKS: NONE

COMPLETED 10/10/94

DEPTH (FT)	GRAPHIC LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE INTERVAL	S.P.T. (IN) (BLOWS/FT.)	ORGANIC VAPOR CONTENT (ppm)	WELL COMPLETION
						SLIP CAP LOCKING WELL PROTECTOR CONCRETE BENTONITE PELLETS 2 INCH DIA SOLID PVC CASING SAND PACK GRADE 10-20 SILICA SAND 0.02 INCH SLOTTED PVC SCREEN WELL POINT
5.0		SILTSTONE; clayey, friable, brown, dry				
10.0		SILTSTONE; argillaceous, well cemented, brown, dry				
14.5						
15.0		SILTSTONE; friable, tan, dry				
17.0		Bottom of Hole = 17.0 feet				

Methane

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

Waste Management Division

Solid Waste Program

406/444-1430

FAX # (406) 444-1499



STATE OF MONTANA

OFFICE 2209 PHOENIX AVE.
LOCATION: HELENA, MONTANA

MAILING PO BOX 200901
ADDRESS: HELENA, MT 59620-0901

September 2, 1994

Kevin J. Hutchins
City of Big Timber Landfill
PO BOX 416
Big Timber, MT 59011

Dear Mr. Hutchins:

I have reviewed the additions to the Big Timber Landfill's Plan of Operations as proposed in your letter of June 2, 1994 and have the following comments:

Waste Screening Plan

The Plan as proposed meets the regulatory requirements for the waste stream anticipated at the landfill. Please remember that all of the waste screening records should be made a part of your operating record and be available for review during Department inspections.

Methane Monitoring

The regulatory requirements for methane monitoring are 25% of the LEL in facility structures and 100% of the LEL at the property boundary. Since the requirements also include that the monitoring be based on site soils, hydrogeology, potential pathways, potential barriers, water levels, and the structures and property boundaries (i.e. distance to the boundary and then the distance to other persons). The methane monitoring plan should include:

1. A map depicting the proposed locations for methane monitoring should be supplied to the Department for approval. This map should show the location of any nearby structures as well as facilities at the landfill.
2. Depth of the proposed probe locations. The methane monitoring points must be located based on the depth to the water table and the depth of any nearby refuse as well as the pathways (like sand lenses) and barriers (such as frost in the winter). The geology at the Big Timber site is such that the water beneath the landfill is mostly in what is called a confined aquifer. This indicates that most of the methane migration pathways should be above this level. Special attention should be paid to shallow sand lenses that are intercepted by the trenches at the landfill.

Big Timber
September 2, 1994
Page Two

3. Suggested locations include on the fence line due West of the current trench, by the gate, and on the fence line due south of the trenches.
4. Culverts should be sampled. Methane/CO₂ mixtures are heavier than air and tend to accumulate in low lying areas.
5. The make and model of the methane meter selected should be supplied to the Department. It should be calibrated with an appropriate methane gas mixture and operated according to the manufacturer's instructions.

I am enclosing a copy of a simple methane plan from Valley County for your information.

Leachate Collection System

The leachate collection system must be operated so that no more than 1 foot accumulates prior to removal. The use of the same probe to measure water levels in the leachate system and the ground water monitoring wells is strongly discouraged. One accidental cross contamination will more than nullify any cost savings of not using dedicated equipment. A simpler method, such as the use of a series of 1 inch PVC pipe sections to probe the leachate riser might be just as effective and cheaper.

The design of the current cell's leachate collection system does not meet the new requirements of Department regulations adopted as a result of the EPA's Subtitle D rules. The next cell (trench) will require a liner and leachate collection system that meets the requirements of ARM 16.14.506. Unfortunately, the Department is not in the landfill design business and will only be able to review designs presented to insure that they meet the regulatory requirements. I would urge you, if you will be continuing to use the landfill beyond the life of the current cell, to begin the design process at least a year in advance of the need for additional space. The design, bidding, and construction may take longer than anticipated. Design requirements are specified in ARM 16.14.506.

Ground Water Monitoring

There appears to be some confusion regarding the status of ground water monitoring at the Big Timber Landfill. As Patricia Potts stated in her letter of April 19, 1994, the seven wells present at the site are adequate to provide for the initial hydrogeological characterization of the site but are not necessarily adequate as a monitoring network. In that letter she also said that Big Timber should immediately begin monthly water level measurements so that an assessment of the flow direction could be made in August and a determination of the adequacy of the existing well placement could be

made prior to October 9, 1994. Since these measurements were not performed, the Department does not have the additional information required to make a decision on these matters. Please commence the required monthly water level measurements at once.

One of the primary reasons for sampling all seven wells was the ability to create a sufficient population of samples for the required statistical evaluation of sampling results. The lack of water level measurements may require that the Department, instead of being able to evaluate a proposed monitoring network, may have to require that a second round of sampling be conducted on all seven wells again in the spring, rather than concentrating the sampling on a reduced number of properly located wells. Please consult with Huntingdon Chen-Northern on the groundwater data analysis required by ARM 16.14.706(12).

A sampling and analysis plan for the landfill is also required. For the first event, the Standard Operating Procedures used by Huntingdon will suffice as this firm has been active at several landfills in Montana and is familiar with Department regulations. They can advise you on the requirements of ARM 16.14.706(1).

Closure Plan

For the time being, the Department has accepted the closure plan as presented on Plan Sheet 4 of 9. "Final Contour Plan" of the Damschen and Associates plans for the landfill dated February 1990. This design may have to change as the Big Timber Landfill progresses to lined cells. The permeability of the final cover infiltration layer must contain a minimum 18 inches of earthen material and have a permeability less than or equal to the permeability of any bottom liner, barrier layer, or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less. I would also call your attention to the construction QA/QC requirements of final cap design specified in ARM 16.14.506(12). The requirements normally require the services of a professional engineer.

The closure of landfill units must be completed within 180 days of the start of closure activities. The unit must be revegetated within one year. The vegetation of closed areas should be done with a grass mix approved by the Soil Conservation Service for the area.

A notation must be placed on the deed to the property indicating that it was used as a landfill.

An estimate of the cost of a third party to close the largest area of the landfill requiring final closure (and proof of the financial mechanism to provide for the closure) must be provided to the Department by April 9, 1994. This estimate must be annually updated and appropriately funded. Must Montana towns do not have the

Big Timber
September 2, 1994
Page Four

financial depth to provide the required financial assurance without setting up a dedicated trust fund. Financial assurance requirements are delineated in ARM 16.14.540.

A 30 year post closure care period is also required. These requirements are specified in ARM 16.14.531(1) and include:

(a) Following closure of each Class II landfill unit, the owner or operator must conduct post-closure care. Post-closure care must be conducted for 30 years, except as provided under (b) of this subsection, and consist of at least the following:

(i) Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(ii) Maintaining and operating the leachate collection system in accordance with the requirements in ARM 16.14.506. The department may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;

(iii) Monitoring the ground water in accordance with the requirements of ARM Title 16, chapter 14, subchapter 7, and maintaining the ground water monitoring system, if applicable; and

(iv) Maintaining and operating the gas monitoring system in accordance with the requirements of ARM 16.14.521.

Following the thirty year post closure care of the unit, a certification by a P.E. must be submitted to the Department.

Run-off control and the Montana Pollution Discharge Elimination System (MPDES) Permit

Barry Damschen sized the run-off detention pond to handle the 24 hour, 25 year precipitation event. This meets current requirements. Your Operations Plan should also reflect a commitment to use appropriate Best Management Practices (BMP's) to eliminate possible point and non-point sources at the landfill. I have attached a copy of the EPA suggestions on BMP's at landfills for your reference.

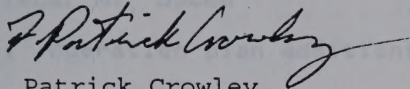
Because the Big Timber Landfill pond design includes two potential discharge points, the spillway and the pipe, it will also require a Stormwater Discharge Permit from the Water Quality Division. Please contact Roxanne Lincoln at 444-5338 for the appropriate application form.

I hope this review of your submittal has been helpful. We understand that landfill operations under the new rules required by the EPA is

Big Timber
September 2, 1994
Page Five

much more complex than before. If we can be of further help, please feel free to contact any of us at the Solid Waste Program.

Sincerely,



F. Patrick Crowley
Solid Waste Regulatory Lead

Enclosures: Valley County Methane, EPA BMP's

Big Timber ~~Methane~~ Co.

File: Twin Bridges Landfill\Sweet Grass County
Path: H:\cbs\03\wp\landfill\BIGT.OPS

I would like to thank Lora Bando for her time and understanding, Jim Wilbur for his willingness to face the mis-informed citizens of Big Timber, and Pat Crowley for his simplistic explanation of the rules and regulations.

I am sure I will hear from you soon.

Sincerely,



Kevin J. Hutchins

RECEIVED

JUN 03 1994

VALLEY COUNTY DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SERVICES

Big Timber
September 2, 1984
Page Five

much more complex than before. If we can be of further help, please
feel free to contact any of us at the Solid Waste Program.

Sincerely,

[Signature]
F. Patrick Crowley
Solid Waste Regulatory Lead

Enclosure: Valley County Response, EPA SWP-2

[Signature]
F. Patrick Crowley
Solid Waste Regulatory Lead

WASTE SCREENING

June 2, 1994

Department of Health and
Environmental Sciences,
Solid and Hazardous Waste Bureau
Helena, MT 59620

Re: Operation plan additions.

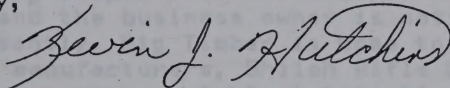
Dear Sirs,

Enclosed you will find the information you requested. The City understands that this is the first draft of the proposed operational plan changes. Any changes or ideas from your department will be appreciated.

I would like to thank Lora Dando for her time and understanding, Jim Wilbur for his willingness to face the mis-informed citizens of Big Timber, and Pat Crowley for his simplistic explanation of the rules and regulations.

I am sure I will hear from you soon.

Sincerely,



Kevin J. Hutchins

RECEIVED

JUN 6 3 1994

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

June 5, 1954

Department of Health and
Environmental Sciences,
Solid and Hazardous Waste Bureau
Helsinki, MT 59601

Re: Operation plan addition.

Dear Sirs,

Enclosed you will find the information you requested. The City understands that this is the first draft of the proposed operational plan changes. Any changes or ideas from your department will be appreciated.

I would like to thank Lora Bando for her time and understanding, Jim Wilson for his willingness to face the well-known citizens of Big Timber, and Pat Crowley for his scientific explanation of the rules and regulations.

I am sure I will hear from you soon.

Sincerely,



Kevin J. Hutchins

RECEIVED

JUN 8 1954

MONTANA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL SCIENCES

WASTE SCREENING

Big Timber has in place a waste screening program during the regular day to day operations of the Solid Waste Department. The Solid Waste personnel come into actual physical contact with all residential waste generated within the city limits. The Solid Waste personnel will accept liquid wastes from residential customers, with certain restrictions. These restrictions include:

1. Paint
 - a. two gallons maximum per stop
 1. the city would prefer the lids on the cans be removed for 3-4 days to allow the VOC's to escape.
2. Used crankcase oil
 - a. one gallon maximum in clear milk jug.
3. No 5 gallon container of any liquid will be accepted.

COMMERCIAL CUSTOMERS

Most commercial customers are picked up on a by the can basis therefore the city personnel can monitor the waste as it is being dumped into the truck. Any questionable waste is removed and the business owner is notified.

Presently, Big Timber is home to one of Montana's finest firearms manufacturers, Shiloh Rifle Company. The rifle company uses water soluble lubricating oil on their machines, and also uses a spinner to reclaim cutting oil from their metal filings.

Big Timber's garages and service stations either use their crankcase oil as fuel for heaters or contract to have the oil removed. All oil filters are punctured and drained before entering the waste stream.

AT THE LANDFILL

Customers at the landfill generally bring refuse to the landfill in the back of a pick-up. The city personnel inspect each load before it is dumped at the working face.

The Big Timber landfill has very few loads that are larger than pick-up size. These loads are generally dump truck and stock truck size. The larger loads are inspected after being dumped at the working face.

City personnel continue to inspect all refuse at the working face during the compaction and burying procedure.

The city will construct a simple waste screening pad following the guidelines on page 37 figure 7 of the Waste Screening at Municipal Solid Waste Management Facilities guidebook. This pad will be used for all questionable loads that enter the landfill.

WASTE SCREENING

Big Tiber has in place a waste screening program during the regular day to day operations of the Solid Waste Department. The Solid Waste personnel wear their usual physical contact with all residential waste generated within the city limits. The Solid Waste personnel will accept liquid wastes from residential customers with certain restrictions. These restrictions include:

1. Paint
2. The gallons maximum per stop
3. The city would prefer the lids on the cans be removed for 3-5 days to allow the VOC's to escape.
4. Used crankcase oil
5. One gallon maximum in clear with jug.

6. No 5 gallon container of any liquid will be accepted.

COMMERCIAL CUSTOMERS

Most commercial customers are picked up on a by the can basis therefore the city personnel can monitor the waste as it is being dumped into the truck. Any questionable waste is removed and the business owner is notified. Presently, Big Tiber is home to one of Montana's finest tire and auto service, Billie's Tire Company. The city personnel use water soluble lubricating oil on their machines, and also use a spinner to recycle cutting oil from their metal filings. Big Tiber's garages and service stations either use their crankcase oil as fuel for heaters or contract to have the oil removed. All oil filters are punctured and drained before entering the waste stream.

AT THE LANDFILL

Customers at the landfill generally bring refuse to the landfill in the back of a pick-up. The city personnel inspect each load before it is dumped at the working face. The Big Tiber landfill has very few loads that are larger than pick-up size. These loads are generally dump truck and stock truck size. The larger loads are inspected after being dumped at the working face. City personnel continue to inspect all vehicles at the working face during the compaction and burying procedure. The city will construct a single waste screening pad following the guidelines on page 37 figure 7 of the Waste Screening at Municipal Solid Waste Management Facilities guidelines. This pad will be used for all questionable loads that enter the landfill.

If the city personnel find any waste that is unacceptable, we will contact the department of Health and Environmental Sciences, Solid and Hazardous Waste Bureau, and we will also contact Chen-Northern, Inc.

Methane and Carbon Dioxide are the primary constituents. Methane is explosive and can collect in buildings or other confined spaces. Methane is explosive at concentrated levels between five percent (LEL) and fifteen percent (UEL) in air.

Methane is lighter than air and tends to rise through refuse or soil and vent into the atmosphere. A portable methane gas meter will be used to measure the concentration 4 times per year in facility structures, in leachate riser, and at the facility property boundaries.

The Big Fisher landfill operators will ensure that the concentration of methane gas generated by the facility does not exceed 25% of the lower explosive limit for methane at those areas that are monitored.

Need snap of 1.5 ft. 5 ft. proposed
location

- 1) wet meter will be used. (Methane content)
- 2) Quarterly monitor
- 3) 100% LEL required

Send

If the city personnel find any waste that is unacceptable, we will contact the Department of Health and Environmental Sciences, Solid and Hazardous Waste Bureau, and we will also contact Chem-Northway, Inc.

METHANE MONITORING

Landfill gas (LFG), produced during biodegradation of the waste can migrate through soils. Methane and Carbon Dioxide are the primary constituents. Methane is explosive and can collect in buildings or other confined spaces. Methane is explosive at concentrated levels between five percent (LEL) and fifteen percent (UEL) in air.

Methane is lighter than air and tends to rise through refuse or soil and vent into the atmosphere. A portable methane gas meter will be used to measure the concentration 4 times per year in facility structures, in leachate riser, and at the facility property boundaries.

The Big Timber landfill operators will ensure that the concentration of methane gas generated by the facility does not exceed 25% of the lower explosive limit for methane at those areas that are monitored.

Need maps of L.F. showing proposed locations.

- 1) what meter will be used. (Mettler carbamate)
- 2) Quarterly monitor.
- 3) 100% LEL required —

Send.

METHANE MONITORING

Landfill gas (LFG), produced during biodegradation of the waste can migrate through soils. Methane and Carbon Dioxide are the primary constituents. Methane is explosive and can collect in buildings or other confined spaces. Methane is explosive at concentrated levels between five percent (LEL) and fifteen percent (UEL) in air.

Methane is lighter than air and tends to rise through refuse or soil and vent into the atmosphere. A portable methane gas meter will be used to measure the concentration a times per year in facility structures, in leachate lines, and at the facility property boundaries.

The Big Timber landfill operators will ensure that the concentration of methane gas generated by the facility does not exceed 25% of the lower explosive limit for methane at those areas that are monitored.

that might 1.1. 2000 proposed

location

1. Work with will be used. (Methane content)

2) Quarterly monitor

3) 100% LEL required

Send

LEACHATE COLLECTION SYSTEM

Purpose

The leachate collection system is designed to collect and convey leachate from the bottom of each pit. A series of perforated pipes are used for this purpose.

In order to detect and collect any leachate that may be generated in the most effective and economical method possible, the operation plan has been developed such that the base elevation of the various trenches slope in a down gradient direction toward the south side of the landfill.

Installation

Filter fabric was placed in the 3:1 slope trench for the leachate pipe.

A layer of coarse aggregate was placed over the fabric, then the pipe was put in. Another layer of coarse aggregate was placed over the pipe, and geo textile fabric was put down to help stop migration of waste and clay particles through the coarse aggregate that may clog the collection pipes.

Cleanout Risers

Cleanout risers are located on the west side of the trench and out of the fill area. The riser is protected by a six foot piece of steel pipe to help guard against accidental damage by landfill equipment.

Monitoring

The city personnel will check monthly for any leachate in the collection system. If leachate is found in sufficient quantities to cause alarm the city will contact the Department of Health and Environmental Sciences, Solid and Hazardous Waste Bureau and Chen Northern Inc.

The leachate riser is equipped with a steel cap that is padlocked at all times. After testing for leachate in the collection system, the probe must be cleaned to prevent the contamination of any groundwater monitoring wells. The probe will be used to measure the groundwater monitoring wells, also. The cleaning or decontaminating will be done per manufacturer's instructions.

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GROUNDWATER MONITORING

The Big Timber landfill currently has 7 monitoring wells. The city will have all 7 of those wells tested for the required list of parameters/constituents listed in Table 1 of ARM 16.14.706. Upon the department's recommendation, the lab will also check for dichlorodifluoromethane in the down-gradient wells.

The city will also initiate a program for measuring water levels in all of the existing wells on a regular monthly basis. This program would coincide with the leachate collection system check.

The city understands this information will be instrumental in determining which wells will be included in the approved monitoring network, and if any additional wells will be needed.

With this information the city will establish a regular schedule for the required semi-annual ground water sampling. This sampling will coincide as closely as possible with high and low water periods during the year.

The firm of Chen-Northern, Inc. did the initial testing of all the wells and in all probability will do any subsequent testing. The city will advise Chen-Northern that the Department requires a Statement of Qualifications before any testing is done.

GROUNDEWATER MONITORING

The Big Timber landfill currently has 7 monitoring wells. The city will have all 7 of these wells tested for the required list of parameters/constituents listed in Table 1 of BSM 12.14.1000. Upon the department's recommendation, the lab will also check for dichlorodifluoromethane in the down-gradient wells.

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CLOSURE PLAN

Closure of filled trenches will be the responsibility of the City of Big Timber. Closure activities described below will take place sequentially as areas of the site are brought to final grades.

Closure of Filled Areas

The Big Timber operation plan is to close off a portion of the cell as the filling operation progresses. Final Closure will begin within 30 days after receiving the last shipment of waste. Final closure will be proceeded by contacting the Montana Department of Health and Environmental Sciences, Solid and Hazardous Waste Division before closure activities begin.

Closure will consist of placing a buffer soil layer, installing a clay barrier layer, placing eighteen inches of cover soil and six inches of topsoil and seeding with native grasses.

Access to the site following final closure will be controlled by providing a locked gate. The fence surrounding the property will be maintained.

The City personnel will make a monthly check for any erosion problems and take corrective action if needed.

*attached. Please call with
any questions
Burr Halley*

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09/30/94

15:10

406 248 9282

406 248 9282

CHEN NORTHERN

001

Huntingdon

600 South 25th Street

P.O. Box 30615

Billings, Montana 59107

(406)248-9161

FAX (406)248-9282

Verbal approved
8:45 AM 10/3/94
J.P. [Signature]

Drill Well
or
This week

FAX TRANSMITTAL

TO:

Pat Crowley

COMPANY:

MDAES

FAX NUMBER:

1-444-1499

JOB NUMBER

FROM:

Brian McHugh

DATE:

9/30/94

OF PAGES

2

(including this page)

If there are any problems receiving this fax, contact:

Cyndi Webber at (406) 248-9161

MESSAGE:

Proposed methane points are
enclosed. Please call with
any questions.

Brian McHugh

SENT BY:

Huntingdon

TAX TRANSMITTAL

TO:

COMPANY:

TAX NUMBER:

FROM:

DATE:

9/30/94 5 OF PAGES 5 (including this page)

If there are any problems receiving this fax, contact:

Cynthia Webber at (408) 248-9161

MESSAGE:

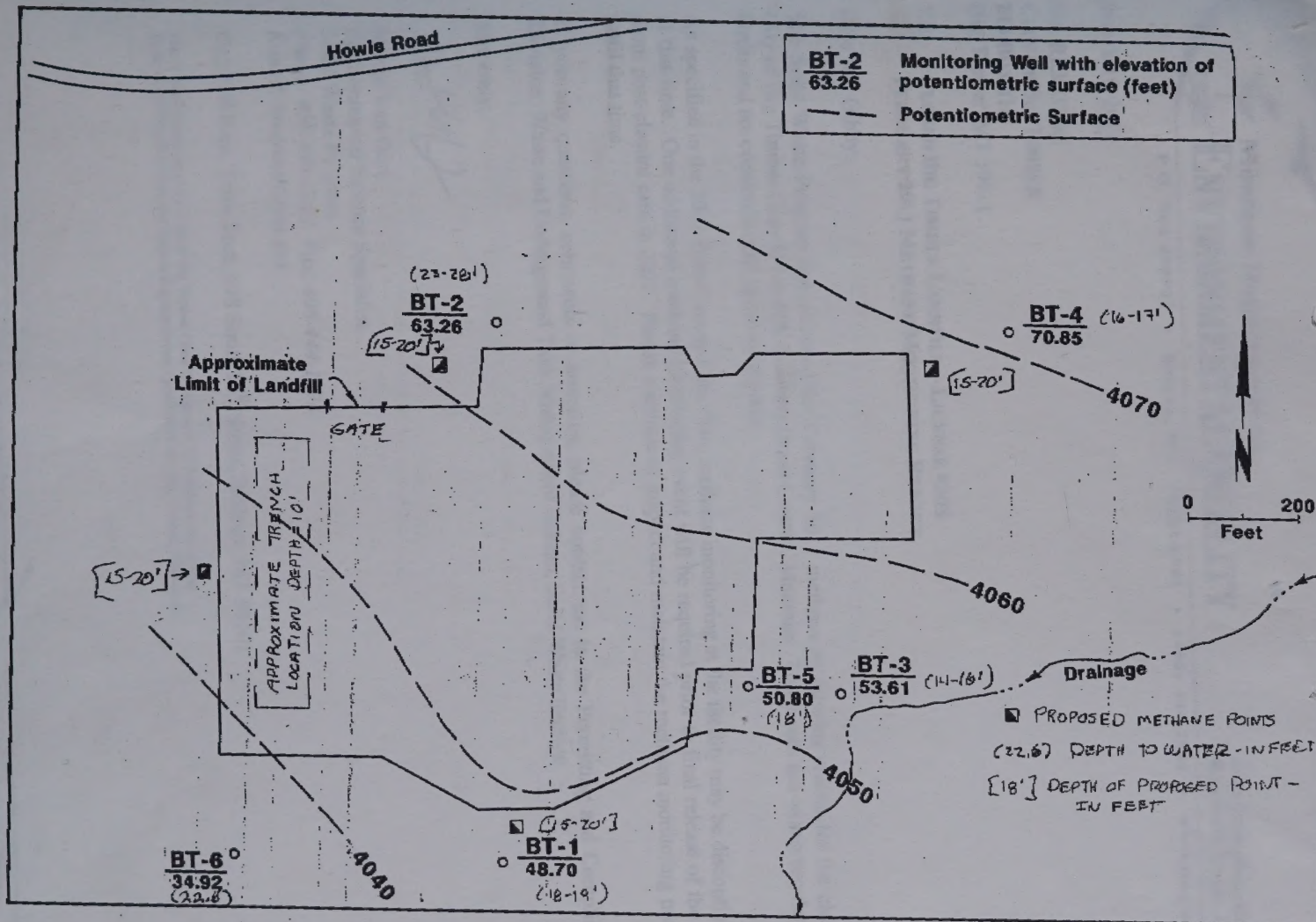
Proposed methane ponds are
enclosed. Please call with
any questions.
Brian M. Kelly

SENT BY:

FAX (408) 248-9161
Bureau, Phoenix 30707
P.O. Box 30612
600 South 25th Street

Handwritten notes at top left, including "Handwritten" and "10/3/94".

Handwritten notes at bottom left, including "This work" and "10/3/94".



MAILED
-1-11



**Montana Department of
ENVIRONMENTAL QUALITY**

Brian Schweitzer, Governor
Richard H. Opper, Director

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

March 31, 2011

Mr. Rick Gibby
CITY OF BIG TIMBER
PO Box 416
Big Timber, MT 59011

RE: **CLOSED BIG TIMBER LANDFILL – LICENSE #308
FEBRUARY 2011 METHANE MONITORING REPORT**

Dear Mr. Gibby:

The Solid Waste Program has reviewed the February 2011 methane monitoring results for the closed City of Big Timber Class II Landfill in Sweet Grass County, Montana. The results are within regulatory limits and are consistent with previous reports.

As specified in the 2007 Post-Closure Care Plan, methane monitoring at the facility may be discontinued at this time. One additional methane monitoring event will be required prior to final release of the site from post-closure care in 2027. Please continue to inspect and maintain the methane monitoring probes until that time.

If you any questions, comments or concerns, please contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Sincerely,

Martin Van Oort
Environmental Science Specialist
Solid Waste Program
Phone: 406-444-2802, Fax: 406-444-1374
E-mail: mvanoort@mt.gov

Cc: Jeff Rice, Tetra Tech, 618 South 25th Street, Billings, MT 59101

File: Closed\Sweet Grass Co.\City of Big Timber Class II\License #308\Methane Monitoring
Path: G:\WUTSWS\Methane\Report Replies\Sweet Grass\2011-02_big_timber_CH4.docx

Correspondence Slip

Originator: MVO

Date Requested: 3/29/11

Date Needed By: 3/31/11

REVIEW
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Name

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Initial/Date

Admin

Proof

Marylt

Review

Rock

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JK 13-29

JK 13-29

RT 13-30-11

Mail original via:

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Fax to addressee at:

Proof Path: G:\WUT\

500 letter

Mail copy of enclosures
to CC's? Y ☒ N

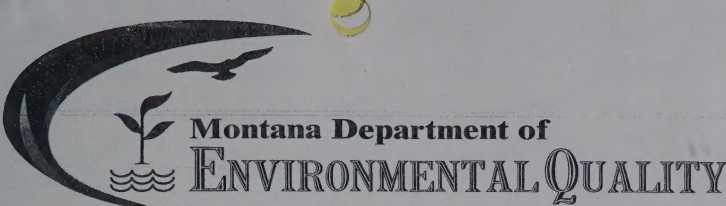
Special Instructions:

Copies of enclosures
for file needed? Y ☒ N

Copy of letter for file
needed? ☒ Y N

Email copies sent? Y ☒ N

EMAIL copy sent to Project Originator? Y N



MAILED
7-14-09 *jk*

Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

July 8, 2009

Mr. Rick Gibby
CITY OF BIG TIMBER
PO Box 416
Big Timber, MT 59011

RE: **CLOSED BIG TIMBER LANDFILL – LICENSE #308**
REVIEW OF MARCH 2009 METHANE MONITORING RESULTS

Dear Mr. Gibby:

The Department has reviewed the March 2009 Methane Monitoring Results for the closed City of Big Timber Class II Landfill in Sweet Grass County, Montana. The results are within regulatory limits and consistent with previous reports.

If you any questions, comments or concerns, please contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Sincerely,

Martin Van Oort
Environmental Science Specialist
Solid Waste Program
Phone: 406-444-2802, Fax: 406-444-1374
E-mail: mvanoort@mt.gov

File: Closed\Sweet Grass Co.\City of Big Timber Class II\License #308\Methane Monitoring
Path: G:\WUT\SWS\Methane\Report Replies\Sweet Grass\2009-03_big_timber_CH4.doc
Cc: Jeff Rice, Tetra Tech, 618 South 25th Street, Billings, MT 59101

Correspondence Slip

Project ID: _____

Requested: 7-2-09

Needed By: 7-7-09

Originator: MVO

Org(s)/Mail Code: _____

REVIEW
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Name

Task

Initial/Date

Admin

Proof

Mary H

Review

Dorell

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Rock

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Jh 7-2-09

Ell 7/7/09

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KT 7-13-09

Mail original via:

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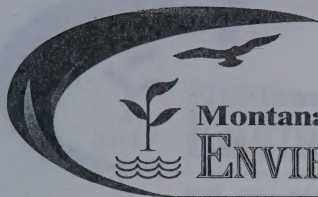
see letter

Mail copy of enclosures to CC's? Y ☒ N

Special Instructions:

Copies of enclosures for file needed? Y ☒ N

Copy of letter for file needed? ☒ Y N



Montana Department of
ENVIRONMENTAL QUALITY

MAILED
6-23-09 *gh*

Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

June 22, 2009

Mr. Rick Gibby
CITY OF BIG TIMBER
PO Box 416
Big Timber, MT 59011

**RE: CLOSED CITY OF BIG TIMBER BIG TIMBER LANDFILL – SWEET GRASS COUNTY – LICENSE #308
MARCH 2009 POST CLOSURE GROUNDWATER MONITORING REPORT**

Dear Mr. Gibby:

The Department has reviewed the March 2009 Post Closure Groundwater Monitoring Report for the Closed City of Big Timber Class II Landfill in Sweet Grass County, MT. The report meets the requirements of the Administrative Rules of Montana (ARM) 17.50.708.

The August 2007 Amended Post-Closure Care Plan stipulated that methane monitoring would be conducted during the groundwater monitoring events in 2009 and 2011, however no methane monitoring results were presented in this report. If these results were omitted in error or are to be submitted under a separate cover, please submit them to the Department at your earliest convenience. If methane monitoring was not conducted, please complete methane monitoring and submit the results to the Department by August 21, 2009.

The facility remains in biennial detection monitoring at this time. If you have any questions, comments, or concerns, please contact me in the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Section.

Sincerely,

Martin Van Oort
Environmental Science Specialist
Solid Waste Program
Phone: 406-444-2802, Fax: 406-444-1374
E-mail: mvanoort@mt.gov

File: Closed\Sweet Grass Co\City of Big Timber Class IILicense #308\Groundwater Monitoring
Closed\Sweet Grass Co\City of Big Timber Class IILicense #308\Methane Monitoring
Path: G:\WUT\SWS\GWater\Responses\Sweet Grass Co\2009-03_Big_Timber_GW.doc
cc: Mr. Jeff Rice, Tetra Tech, PO Box 30615, Billings, MT 59107



Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

September 18, 2007

Mr. Rick Gibby
CITY OF BIG TIMBER
PO Box 416
Big Timber, MT 59011

**RE: CLOSED BIG TIMBER SANITARY LANDFILL - LICENSE #308
AUGUST 2007 METHANE MONITORING RESULTS REVIEW**

Dear Mr. Gibby:

The Department has reviewed the Closed City of Big Timber Class II Landfill's August 2007 methane monitoring report. The results are within regulatory limits.

If you have any questions regarding this review, please contact me directly at the Permitting and Compliance Division, Waste and Underground Tank Management Section, Solid Waste Program.

Respectfully,

Mary Louise Hendrickson
Environmental Science Specialist
Solid Waste Regulatory Program
Phone: 406-444-1808; Fax: 406-444-1374
Email: mhendrickson@mt.gov

File: Closed\Sweet Grass County\City of Big Timber Class II\License#308\Methane Monitoring
Path: G:\WUTSWS\Methane\Report Replies\Sweet Grass\Big-Timber-091307.doc
cc: Mr. Jeff Rice, Tetra Tech, PO Box 30615, Billings, MT 59107

Correspondence Slip

Project ID: 9-18

Needed By: _____

Org(s)/Mail Code: _____

Initial/Date

Requested: 9-18

Originator: meb

Task

Name

Janet
Rich

review
↓

AK, 9-17-07
RT, 9-18-2007

REVIEW
ROUTING

Mail original via:
☒ Regular

☐ Certified ☐ Registered ☐ FedEx

Proof Path: G:WUT:

All letter

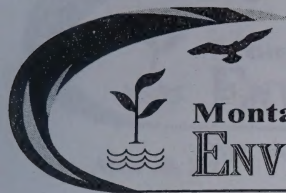
Special Instructions:

Fax to addressee at

Mail copy of enclosures
to CC's? Y N

Copies of enclosures
for file needed? Y N

Copy of letter for file
needed? ☒ Y N



**Montana Department of
ENVIRONMENTAL QUALITY**

Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

February 8, 2008

Ms. Gail McPherson
City of Big Timber Public Works
P.O. Box 416
Big Timber, MT 59011

**RE: APPROVAL—UPDATED POST-CLOSURE CARE PLAN
City of Big Timber Class II Landfill (Lic. #308)**

Dear Ms. McPherson:

The Department has completed its review of the updated Post-Closure Care Plan submitted to support the post-closure FA cost estimates for the City of Big Timber Class II landfill.

The Closure/Post-Closure Plan update is approved as submitted.

The required financial assurance update will be addressed separately.

If you have any questions or comments, please contact me for assistance at the Permitting and Compliance Division: Voice (406) 444-4725 or email tstepp@mt.gov.

Sincerely,

Tim Stepp
Solid Waste Program
Waste & Underground Tank Management Bureau

File: **Lic. # 308 /Sweet Grass Co/class II/Big Timber /Closure-Post Closure**
Path: G:\WUT\SWS\closure\bigTimber\BigTimberCPCPlanApprov0208.doc



**Montana Department of
ENVIRONMENTAL QUALITY**

MAILED
5-3-07

Brian Schweitzer, Governor

April 30, 2007 P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

Ms. Diana Taylor
P.O. Box 416
Big Timber, MT 59011

**RE: NOTICE OF DEFICIENCY-POST CLOSURE CARE & FINANCIAL ASSURANCE
Big Timber Class II Landfill (Lic. #308)**

Dear Ms. Taylor:

Post closure care at the Big Timber Class II landfill must meet the requirements of ARM 17.50.531. In particular, the Department conditionally approved (on 9/6/01) groundwater monitoring at the facility once every two years in the absence of detected contaminants, but the last monitoring event was on April 27, 2001. Your request for a one-time extension of the monitoring event is approved as long as it is accomplished no later than September 30, 2007. Given the gap in monitoring data, at least three more sampling events are required (2007, 2009, & 2011). You may contact Mary Hendrickson (phone 406.444.1808) for landfill groundwater and methane monitoring assistance.

Please submit for approval an updated 30-yr Post Closure Plan that includes sections requiring groundwater monitoring every two years until released by approval, quarterly methane monitoring, and annual inspection by a registered engineer (report and cost estimate updates due April 1 each year). Also, please submit for approval documents verifying the current annual adjustment of the itemized 30-yr post-closure cost estimates and the Certificate of Deposit (CD) funds to cover all anticipated post-closure costs according to ARM 17.50.540. The CD mechanism requires a standby trust to potentially accept funds from the CD as necessary (upon DEQ request). Please execute the standby trust agreement mailed to the City (on compact disk) with the Department's annual FA letter in 2006. The Department can also email a copy of the trust form to you.

We appreciate your prompt response. For assistance, please contact me at the Permitting and Compliance Division: Voice (406) 444-4725 or email tstepp@mt.gov.

Sincerely,

Tim Stepp
Solid Waste Program
Waste & Underground Tank Management Bureau

Cc: Mary Hendrickson, DEQ Solid Waste Program
File: Lic. # 308 Sweet Grass Co/Big Timber/Class II/Post Closure ... and... /FA
Path: G:\WUTSWS\FA\bigTimber\BTimberPC-FANOD0307.doc

